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the present volume seems to embody his most significant efforts in this direction thus far. We hope others may follow for our subject needs popularization as may be seen from some of the attacks thereon.

G. A. MILLER.

Stereometrie. By KARL ROHN, with an introductory note by FELIX KLEIN. Leipzig, Robert Noske, 1922. xvi + 188 pages. Price in Germany, $1, American currency.

This work was substantially ready for publication at the time of Professor Rohn's death, in August, 1920,[1] the necessary completion of the manuscript in minor details having been done by his friend and former pupil Dr. Friedrich Wünschmann. Dr. Rohn was himself a pupil of Professor Klein, and the latter, in his appreciative introduction, speaks highly of his skill in the field of geometry.

The work sets forth in succinct form the essential features of modern projective geometry with respect to solids, thus extending the ordinary treatment of the projective properties of figures in a plane to those of three dimensions. It begins with a review of plane geometry (50 pages) and then considers the sphere, cylinder, and cone, proceeding later to the properties of conic sections and other plane figures in space.

The work shows a return to the better type of German bookmaking of prewar days and will be welcomed by students of modern geometry as an aid to their advanced work in this field.

DAVID EUGENE SMITH.

NOTES.

Professor SOLOMON LEFSCHETZ, of the University of Kansas, is now one of the collaborators on the *Bulletin des Sciences Mathématiques*, Paris. In the issue for December, 1922, pages 417–424, the three reviews of recent publications are by him. They are of L. SILBERSTEIN, *The Theory of General Relativity and Gravitation*, University of Toronto Press, 1922; G. C. EVANS, *Functionals and their Applications*, American Mathematical Society, 1918; and O. VEBLEN, *Analysis Situs*, American Mathematical Society, 1922.

The *Bulletin des Sciences Mathématiques* for December, 1920 (series 2, volume 44) devotes forty-one pages (297–337) to a review by E. CARTAN of Sir THOMAS MUIR, *The Theory of Determinants in the Historical Order of Development*, volumes 1–3 (London, 1906, 1911, 1920, see this MONTHLY, *1920*, 419). In this review an account is given chapter by chapter of the contents of the three volumes, bringing the history of determinants down to 1880. The reviewer points out how difficult it is in mathematics and in all branches of science to determine the paternity of any important theorem or discovery, and the inestimable value of the work of Sir Thomas in securing for us this information in the case of determinants.

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[1] See this MONTHLY, *1921*, 43.

The *Bulletin of the Calcutta Mathematical Society* has been published continuously since April, 1909, and the third number of volume 12 was issued in December, 1921. The first volume of a new periodical, *Journal of the Department of Science,* was published by the University of Calcutta in 1919. The first part of 70 pages was devoted to papers in Chemistry; the second of 208 pages to papers in Mathematics; then Physics (43 pages) and Botany (5 pages). The 14 mathematical papers dealt almost wholly with topics of applied mathematics. The second volume of the *Journal,* 1920, contained Mathematics (186 pages, 17 papers), Physics (91 pages), and Botany (36 pages); the third volume, 1921, Mathematics (236 pages, 20 papers), Physics (54 pages), and Botany (8 pages). In the later volumes there were several papers on pure mathematics: for example, "Origin of the Indian cyclic method for the solution of $Nx^2 + 1 = y^2$" (volume 2, 69–76), "A note on Whittaker's formula for the solution of algebraic or transcendental equations" (volume 3, pp. 41–44).

Just forty years ago appeared a memoir of AUGUSTUS DE MORGAN (1806–1871) with a selection from his correspondence, and a fairly complete list of his publications; it was prepared by his wife Sophia (Frend). De Morgan was one of seven children and he had seven children himself. His eldest son was William Frend De Morgan (1839–1917), artist, potter, inventor, and finally, at the age of 67, novelist; he was the author of *Joseph Vance* (1906), *Alice-for-Short* (1907), *Somehow Good* (1908), and other notable books. "I paid no heed," he said, "to the wisest and best man I have ever known—my father, of course—and went my own headstrong way. . . I went my own way and wasted an odd forty or fifty years." "If you work hard, Willy," his father had said to him, "you will live to write something worth reading." To her list of delightful biographies, Mrs. Anna M. W. Stirling has now added: *William De Morgan and his Wife* (New York, Holt, 1922). The mathematician will naturally turn with interest to this volume where, among other things, there is new information concerning Augustus De Morgan's Anglo-Indian ancestry.

The third and last part (15 + 945–1509 pages) of *Jahrbuch über die Fortschritte der Mathematik,* volume 45, for 1914–1915, was published in September, 1922; compare *1920,* 268, and *1921,* 315. The price of this part for Germany is (November, 1922) 920 marks; for the United States, $7.30 plus cost of postage and packing. The publishers, Vereinigung wissenschaftlicher Verleger, Berlin, demand $20.95 for the complete volume of 1524 pages. For volume 42, 1211 pages, published before the war and on far better paper, the price was $9.25. In the list of over one hundred "Mitarbeiter" for volume 45 is the name of Professor W. C. GRAUSTEIN of Harvard University.

The notable list of works in Teubner's "Sammlung von Lehrbüchern auf dem Gebiete der mathematischen Wissenschaften mit Einschluss ihrer Anwendungen" is well known; but except for Pringsheim's *Vorlesungen über Zahlenlehre,* 1916–1921, no works have lately been added to this series. The leading publisher of new mathematical works in Germany now is Julius Springer of Berlin. He has recently started to issue a series of works under the general heading "Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen." The series is under the general editorship of Professor RICHARD COURANT, Klein's successor at the University of Göttingen, assisted by Professor WILHELM BLASCHKE, of the University of Hamburg, and Professors MAX BORN and CARL RUNGE, of the University of Göttingen. At this date (November, 1922) three volumes have appeared. I: *Vorlesungen über Differential-Geometrie und Geometrische Grundlagen von Einsteins Relativitätstheorie* by W. BLASCHKE, 1921, 10 + 230 pages. This is simply the first of three volumes and deals with the elements of the subject. An English translation will probably be published in England within a year. II: *Theorie und Anwendung der unendlichen Reihen* by K. KNOPP, 1922, 10 + 474 pages. III: *Vorlesungen über allgemeine Funktionentheorie und elliptische Funktionen* by ADOLF HURWITZ, *ergänzt durch einen Abschnitt über geometrische Funktionentheorie* by R. COURANT, 1922, 11 + 399 pages. Professor Courant's section occupies pages 245–392. The fourth volume of the series, also announced for 1922, is to be: *Die mathematischen Hilfsmittel des Physikers* by E. MADELUNG. The volumes so far published are very valuable, exceedingly interesting, and issued in attractive form, on good paper, in both bound and unbound editions. It is to be hoped that Springer will not drive away American purchasers by extortionate charges such as he has recently made for *Mathematische Zeitschrift.*

Among recent German publications are the following (the prices are those for Germany, and the dates of publication are 1922 unless otherwise indicated): L. BIEBERBACH, *Differential- und Integralrechnung,* vol. 1 (Teubner's technische Leitfäden, vol. 4). Leipzig, Teubner (6 + 132 pp. 24 marks)—L. BIEBERBACH, *Lehrbuch der Funktionentheorie, Band 1: Elemente.* Leipzig, Teubner, 1921 (6 + 314 pp. 70 marks)—H. DINGLER, *Relativitätstheorie und Ökonomieprinzip,* Leipzig, Hirzel (77 pp. 30 marks)—H. DÖLP, *Grundzüge und Aufgaben der Differential- und Integralrechnung nebst den Resultaten,* neu bearb. von E. Netto, 16 Aufl. Giessen, Topelmann (2 + 214 pp. 24 marks)—A. EINSTEIN, *Vier Vorlesungen über Relativitätstheorie gehalten im Mai, 1921, an d. Universität Princeton.* Braunschweig, Vieweg (3 + 70 pp. 60 marks)—J. E. GERLACH, *Kritik der mathematischen Vernunft.* Bonn, F. Cohen (162 pp. 65 marks, bound) —A. MOSZKOWSKI, *Einstein, Einblicke in seine Gedankenwelt. Gemeinverständliche Betrachtungen über die Relativitätstheorie und ein neues Weltsystem. Entwickelt aus Gesprächen mit Einstein.* 35–40th thousand. Berlin, F. Fontane (240 pp. 45 marks, bound)—G. SALMON- W. FIEDLER, *Analytische Geometrie des Raumes.* Unter Mitwirkung von A. Brill neu herausgegeben von K. Kommerell. Teil 1, Die Elemente u. d. Theorie d. Flächen zweiter Ordnung. 5. Aufl. Lieferung 1, Leipzig, Teubner (10 + 366 pp. 180 marks)—L. SCHRUTKA, *Elemente der höheren Mathematik für Studierende der technischen und Naturwissenschaften.* 2. verb. Aufl. Leipzig and Vienna, F. Deuticke, 1921 (30 + 635 pp. 68 marks).

This year marks the fortieth anniversary of one of the most distinguished of mathematical journals, *Acta Mathematica.* This periodical is of particular interest to American scholars on account of its consistently international character and high scholarly standing. The recent outbreak of nationalistic jealousies renders of timely interest an account of the circumstances leading to the establishment of this famous quarterly. No small part of the popularity of the *Acta Mathematica* has been the prolific writings of POINCARÉ that have appeared in its pages.

To quote briefly from a prospectus,

> "The periodical was founded under the inspiration and with the active encouragement of the greatest mathematicians of that time: CHARLES HERMITE and KARL WEIERSTRASS.
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> "Feeling deeply that mathematical science has a place which is independent of local and national points of view, these two pioneers in abstract thought were able to disengage themselves from the animosity, which the then recent war had quite naturally excited among the belligerents.
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> "This animosity had been such as to threaten to break even the scientific ties between two great nations. CHARLES HERMITE and KARL WEIERSTRASS wished to reestablish these connections as soon as possible, and gave as their opinion that mathematicians, whose subject was fundamental in every other science, ought here to take the first step. . . .
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> "A committee of the most noted mathematicians of the four Scandinavian countries assumed scientific control of the periodical, the first part of which was issued in 1882. The first page is illustrated by a reproduction of the only original portrait in existence of NIELS HENRIK ABEL, the greatest mathematician of Scandinavia and the intellectual teacher—though not, it is true, through personal contact—of HERMITE and WEIERSTRASS. The periodical begins with the memoir:
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> "'Théorie des groupes fuchsiens' by the young and still unknown pupil of the 'Ecole polytechnique' and 'Ecole nationale des Mines' of France, HENRI POINCARÉ (born in 1854, d. in 1912), he who during his short life was—as PAUL PAINLEVÉ once said—'le cerveau vivant des sciences rationnelles, mathématiques, astronomie, physique, cosmogénie, géodésie, l'inventeur incomparable qui a tout embrassé, tout pénétré, tout approfondi.'
>
> "Nearly every one of the first 35 volumes of the *Acta Mathematica* (vols. 1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 16, 20, 21, 22, 26, 29, 31, 32, 33, 35) contains one or several memoirs by POINCARÉ, all characterized by the penetrating power of thinking, the genius for discovery, and the masterly insight into the greatest problems of science, on which Painlevé had dwelt. The works published by Poincaré in the *Acta Mathematica* occupy in all 1,468 pages."

Since our last report (*1921*, 316) concerning *Publications of the Massachusetts Institute of Technology*, "Contributions from the Department of Mathematics," twenty parts (nos. 23–42, November, 1921–June, 1922) have been published. These parts contain articles by F. L. HITCHCOCK, JOSEPH LIPKA, C. L. E. MOORE (2), H. B. PHILLIPS (3), L. H. RICE (2), GEORGE RUTLEDGE, J. S. TAYLOR, NORBERT WIENER (5), S. D. ZELDIN (2), in addition to joint papers by F. L. HITCHCOCK and N. WIENER, and J. L. WALSH and N. WIENER, reprinted from: *Bulletin of the American Mathematical Society* (see *1922*, 73), *Comptes Rendus du Congrès International des Mathématiques à Strasbourg* (*1920*, 440; *1921*, 378), *Journal of Mathematics and Physics* (*1921*, 380–381), *Proceedings of the London Mathematical Society*, *Proceedings of the National Academy of Sciences* (*1922*, 75–76). The papers not listed in the above references are as follows:—In the *Journal*, volume 1: "Hyperquaternions" by Moore, 63–77; "Explicit determination of Cotes' coefficients for polynomial area" by Rutledge, 77–84; "A certain type of product and the combinatory analysis involved in its expansion" by Rice, 85–87; "The equivalence of expansions in terms of orthogonal functions" by Walsh and Wiener, 105–122; "Note on the normal planes to a surface in a space of four dimensions" by Moore, 147–156; "Commutativity of contact transformations of mechanics" by Zeldin, 157–159; "On the expression of the sum of any two determinants as a determinant of more dimensions" by Rice, 160–166; "A new type of integral expansion" by Wiener, 167–176; and "Note on Einstein's theory of gravitation" by Phillips, 177–190. In *Proc. Lond. M. S.*, new series, volume 20: "The group of the linear continuum" by Wiener, 329–346. In *Proc. Nat. A.*, volume 8, 1921: "A solution of the linear matrix equation of double multiplication" by Hitchcock, 78–83.

ARTICLES IN CURRENT PERIODICALS.

AMERICAN JOURNAL OF MATHEMATICS, volume 44, no. 1, January, 1922: "An arithmetical dual of Kummer's quartic surface" by E. T. Bell, 1–11; "Incidences of straight lines and plane algebraic curves and surfaces generated by them" by A. Emch, 12–19; "On the theorems of Gauss and Green" by V. C. Poor, 20–24; "An extension of the Sturm-Liouville expansion" by C. C. Camp, 25–53; "Conformal transformations of period n and groups generated by them" by H. Langman, 54–86.

L'ENSEIGNEMENT MATHÉMATIQUE, volume 22, nos. 3–4, published July, 1922: "Familles additives et fonctions additives d'ensembles abstraits" by M. Fréchet, 113–129; "Sur les foyers rationnels d'une courbe algébrique" by P. Appell, 129–132; "Sur les foyers rationnels des courbes planes" by E. Turrière, 133–135; "Sur les tractrices et les courbes équitangentielles" by C. de Jans, 136–145; "Sur certaines identités géométriques et leur traduction algébrique by P. C. Delens, 146–152; "Sur le déplacement d'un point dans l'espace à n dimensions. Géométrie du n-èdre" by G. Tiercy, 152–167; "Sur les formules de Lorentz" by B. Niewenglowski, 167–169; "Applications géométriques de la crystallographie" (conclusion) by M. Winants, 170–194; "Déduction des dérivées de fonctions circulaires par la méthode géométrique des limites" by B. Petronievics, 195–208; "Déduction géométrique de l'expression pour le rayon de courbure" by J. M. Child and B. Petronievics, 209–214; "Camille Jordan (1838–1922)" by A. Buhl, 214–218; "Einstein au Collège de France" by R. Wavre, 219–222; "Bibliographie" and "Bulletin bibliographique," 228–248.

ISIS, volume 4, no. 2, 1922: "The teaching of the history of science" by G. Sarton, 225–249 ["What is the present status of the teaching of the history of science in European and American universities? The lists and announcements of courses which have been published in various journals, may give the reader a very misleading impression. For these lists are many and some are quite long, but most of it is mere bluff. For example, many such courses have been extemporized in America, but, with one exception (CAJORI), I do not know of any course delivered by a lecturer having the rank and emoluments of a professor and devoting himself exclusively to it. To be sure, some of these courses offered as a 'side show' by scholars whose main business is to study and to teach something totally different, may be very interesting. . . . We owe some of the best work in every field to the capricious efforts of *dillettanti*, but we can never depend upon them and we must of necessity expect the main advances in knowledge to be made by men whose sole duty is to make them and who give their every thought to it. . . . The *history* of *science* is a historical discipline; it is also a scientific discipline. The historian of science must have a sound knowledge of two sets of facts: historical facts and scientific facts. . . . Historical and scientific errors must be equally avoided, but many historical errors are only venial offences, while the scientific errors are deadly sins. The former, indeed, imply merely a misapprehension of the accessory circumstances, while the latter prove that the very substance of one's investigations has not been understood."]; 'L'enseignement de la mécanique en France au XVII^e siècle" by P. Boutroux, 276–294; "The development of trigonometric methods down to the close of the XVth century. (With a general account of the methods of constructing tables of natural sines, down to our days)" by J. D. Bond, 295–323.

MATHESIS, volume 36, July, 1922: "Nouveaux triangles spéciaux" by J. Neuberg, 257–259 ["*L'Index du Répertoire bibliographique des Sciences mathématiques* contient la rubrique: *Triangles spéciaux. a.* Triangle isoscèle. *b.* Triangle équilatéral. *c.* Triangle rectangle. Il y manque évidemment la division: *d.* Autres triangles spéciaux. En effet, est nombreuse la liste des triangles particuliers que l'on recontre dans la Géométrie récente du triangle; elle fournit de bons exercices et d'intéressants sujets d'étude."]; "Sur la vie moyenne d'une obligation" by A.